

Synthetic antibodies

This mentoring project aims at developing molecularly imprinted polymer (MIP) nanogels, also known as synthetic antibody mimics, directed against biomarkers of societally important diseases.

Molecular imprinting creates specific recognition sites for a target molecule within a synthetic polymer network through the use of a molecular template. These materials can then be used for the selective binding of target biomarkers from even complex mixtures, and thus for different applications in the field of affinity technology, such as immunoassays, bioseparation, bioimaging, biosensors, or as drugs (inhibitors).

The project comprises the synthesis of MIPs, their physico-chemical characterization, affinity evaluation by different methods, and one of the above-mentioned applications (to be determined).



Mentor

Professor Karsten Haupt (CNRS Institute for Enzyme and Cell Engineering) is a Biochemist from the University of Leipzig, Germany. After obtaining a PhD in Bioengineering from UTC, France, he was a researcher at Lund University, Sweden and at INSERM, Paris, and an assistant professor at the University of Paris 12. Since 2003 he has been a full professor of Bioengineering at UTC, where he is now the Head of the CNRS Laboratory for Enzyme and Cell Engineering. Karsten Haupt is a Senior Member of Institut Universitaire de France, and the co-founder of the companies PolyIntell (now Affinisep, 2004) and SensWay (2021). His present research interests include affinity technology, chemical sensors, synthetic antibodies (molecularly imprinted polymers), biomimetic polymers and nanomaterials for biomedical applications. He has 177 publications and an H-factor of 63.
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Student profile

Master or final undergraduate in chemistry, bioengineering, materials engineering

Subjects

- Functional nanomaterials for nanomedicine
- In-silico methods for antigen epitope design
- Synthesis of molecularly imprinted polymer (MIP) nanogels as synthetic antibody mimics
- Physico-chemical and affinity evaluation methods of MIP nanogels and their application in bioimaging